

APPENDIX: *Sensitivity Analysis*

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The purpose of this appendix is to provide the interested reader with access to results from some of the analytical work undertaken in support of the Panel's mandate. The tools used in this work are computer simulation models maintained by the Alberta Department of Energy (ADOE). (Note the exception on page 5 below.) Some of these models reflect conditions in Alberta, while others are applicable to a number of comparator jurisdictions.

The information presented in the following pages can be grouped under two broad headings. First are charts reporting on the estimated shares of divisible income accruing to owners and governments (both Alberta and federal, when appropriate) for "typical" natural gas, conventional oil, and oil sands development and production projects in Alberta and in comparator jurisdictions. "Divisible income" is defined as project revenues minus all costs of exploration, development, and production. Payments accruing to resource owners and governments here include rentals, royalties, severance and related taxes, and corporate income taxes. The consequences of direct government participation in the construction and operations of projects are also included, as appropriate. As is typical of work done in this area in general, bonus payments are excluded. (It is a real challenge to include bonuses in the kinds of models used here: actual, observed bonuses vary with price and cost conditions, which makes it very difficult to treat these in a meaningful and appropriate manner in such models.) As noted in the Report, the added precision about "owners and governments" is of no consequence for Alberta, since the projects considered are assumed to be located on Crown land. In some comparator jurisdictions (e.g., onshore U.S.), however, the resources are privately owned, so that the "owner" is not the "government", hence the need for the added precision.

Some of these charts - here labelled "(Undiscounted - as in text of Report)" - are replicated from the Report, to make comparisons easier. Each of these charts has a counterpart - labelled "(Discounted @ 5% Real)" - that presents the same shares, but this time calculated to incorporate the consequences of a real discount rate of 5%. Typically, the estimated "(Discounted @ 5% Real)" combined ownership and government shares of divisible income are slightly higher. This is a reflection of the fact that the type of energy-production projects considered here are characterized by periods of expenditures on development that precede the onset of production. In the calculations, this means that the estimated real value of the costs will be higher than the estimated real value of the revenues (in comparison to undiscounted cases), simply because the latter occur later in the life of the project and are thus more heavily discounted.

The second type of information provided are the results of numerous simulations of the ADOE models that estimate both discounted and undiscounted government shares of divisible income for the same "typical" projects in Alberta across a number of assumed prices and cost levels. This information is presented in the form of "fiscal maps" so that for each project considered, government shares of divisible income are reported for many combinations of prices and cost levels. A subset of this information was used in the construction of the charts discussed above. For context purposes, measures of investor profitability are added in separate tables.

The government/resource owner share target identified by the Panel as competitive and representing a fair share for Albertans and Canadians ("share" included Federal Corporate Income Tax) is based on a comprehensive inter-jurisdictional competitiveness analysis. The Panel equally considered the perspective of the energy companies by modeling the various investment decision-making criteria employed by industry. Industry decision-making criteria include rate of return, net present value ("NPV"), and profitability ratio analysis. The results of this analysis for all the resource sectors (natural gas, conventional oil, and oil sands) and comparable jurisdictions are contained in this appendix and the associated data appendix.

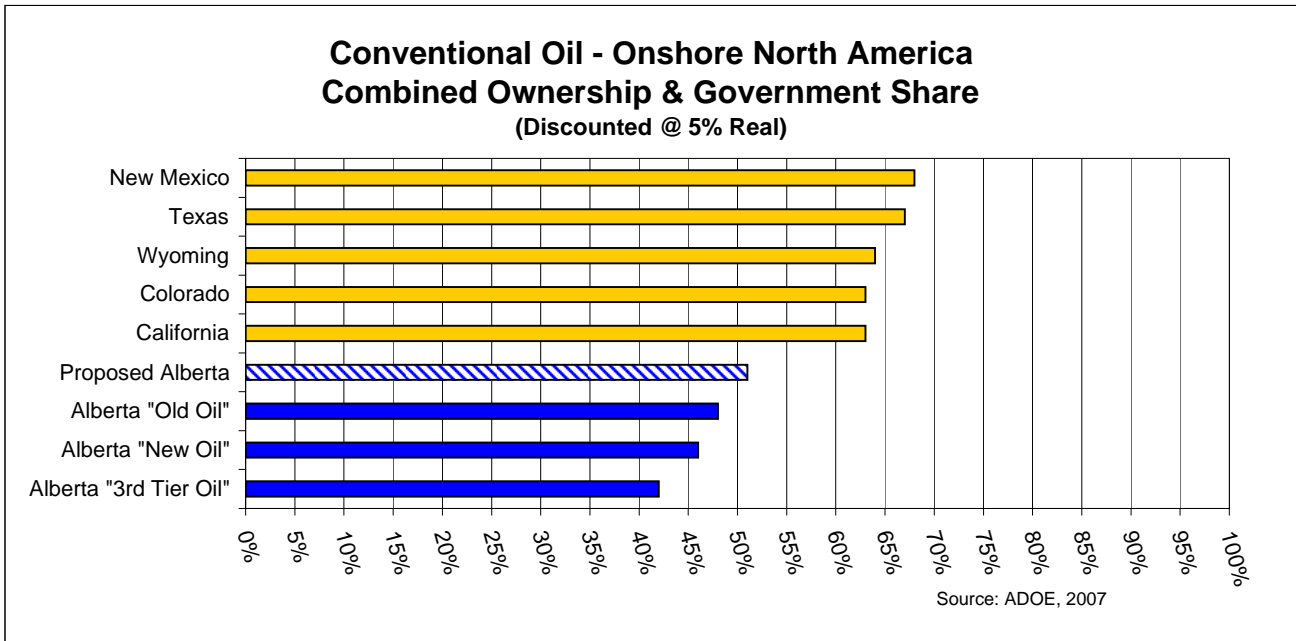
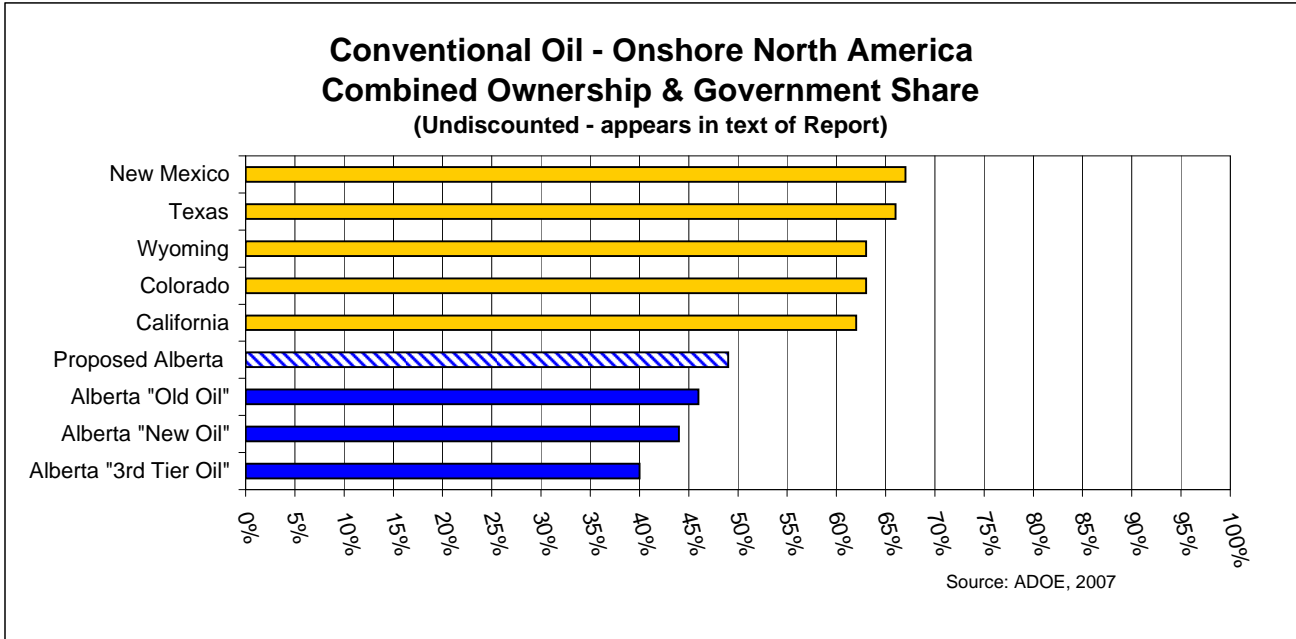
In addition, the Panel employed third party analysis to validate its recommendations and the Department of Energy's work. This work was completed by Dr. Pedro van Meurs, an internationally recognized world expert on global oil & gas royalty and tax systems. The results obtained by Dr. van Meurs are consistent with the results of Alberta Energy's work; under the Panel's proposed regime, Alberta will remain a very competitive destination for investments in energy projects across all three commodity types in this province.

Note that it was Dr. van Meurs' old 1997 report about international Government Take rankings that was repeatedly cited by industry representatives and energy company executives during the Panel's public hearings across Alberta during the Spring and Summer of 2007. The Panel was repeatedly told that Alberta ranked very high in Government Take, but the presenters were citing Dr. van Meurs' old 1997 report. It is true that Alberta had a much higher level of Government Take in 1997 compared to other jurisdictions, but Dr. van Meurs' more recent, up to date work for the Panel indicates that the very opposite is now unequivocally true: the situation has changed dramatically since 1997. Based on the current situation, Alberta's Government Take ranks very low against competing jurisdictions, especially in the oil sands arena.

All of this data, including Dr. van Meurs' reports, can be found on Alberta Energy's web site and on the Panel's web site

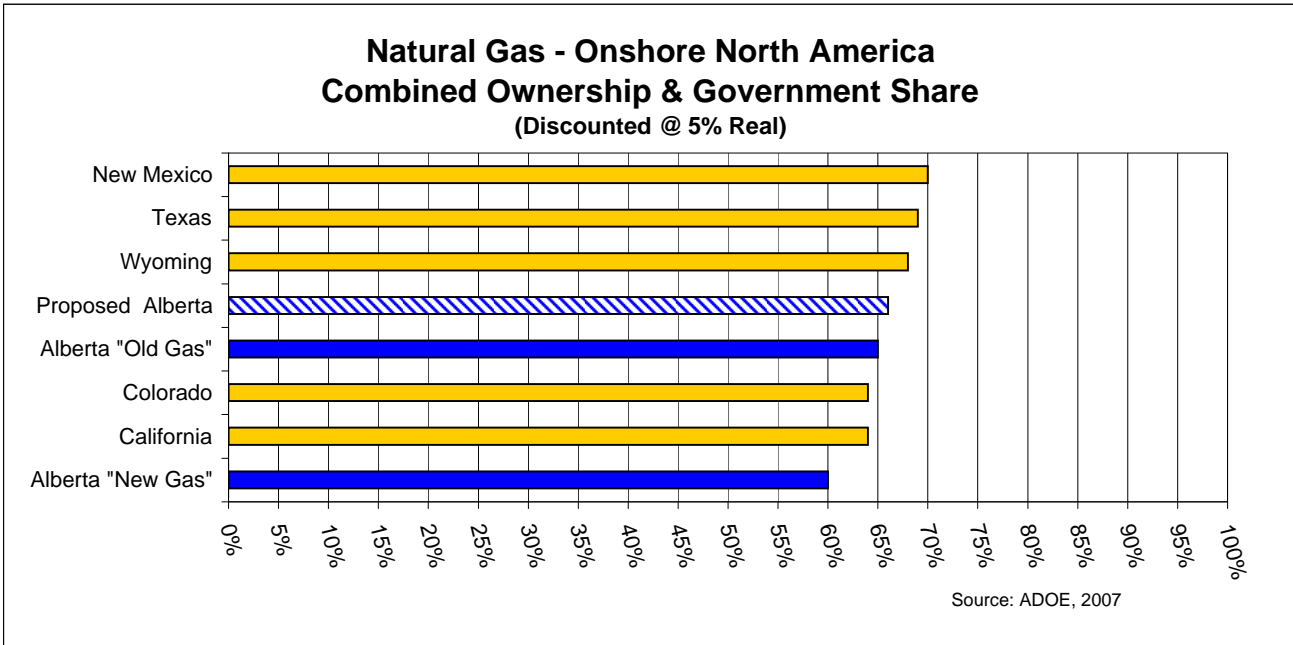
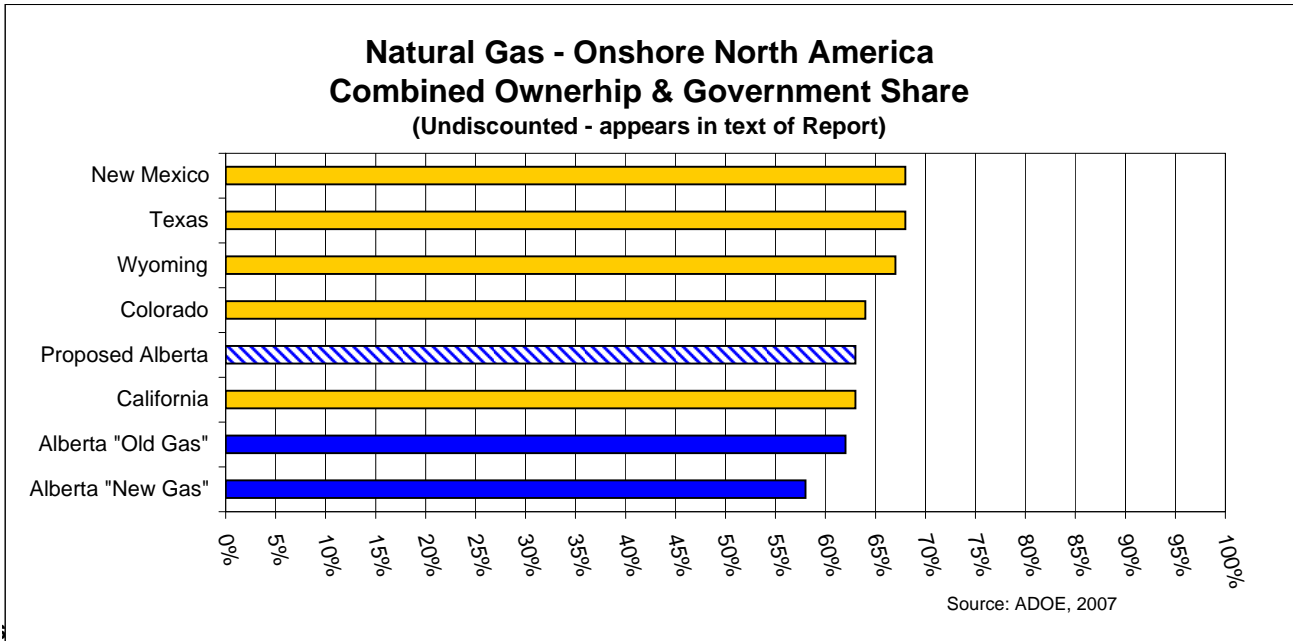
All in all, the information contained in these appendices reports on the types of sensitivity analysis that were undertaken using the ADOE models. These include the choice of discount rate (zero in the undiscounted cases, and a real rate of 5% in the discounted cases), ranges of assumed prices and cost levels, and different combinations of all these aspects. Estimates obtained for comparator jurisdictions are also presented. Finally, note that in model simulations the Canadian dollar was assumed to be worth \$(US) 0.93.

One final word of caution. It is important to remember that in the transition from model results to actual outcomes, different royalty and tax instruments will have different operational properties: there is less uncertainty about the revenues that can be expected from a flat-rate royalty on production revenues than from a royalty levied against net operating revenues, for example. In general, simulation models of the type used here are better suited to deal with the first kind of royalty and tax instruments than with the second kind.



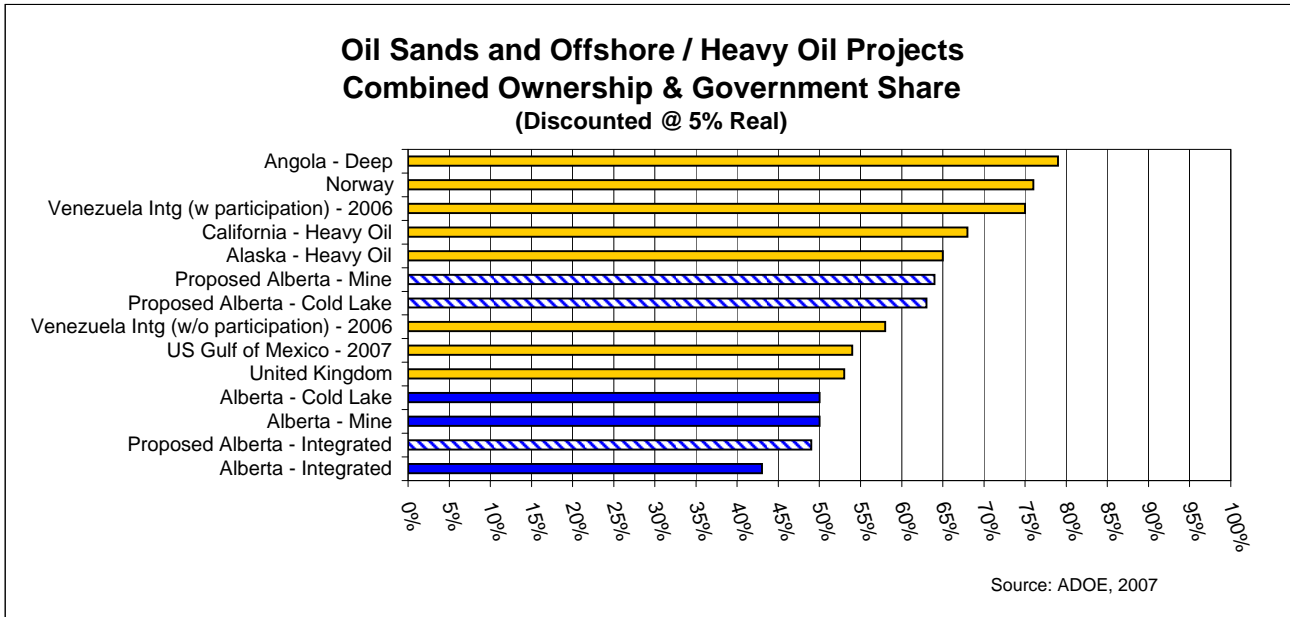
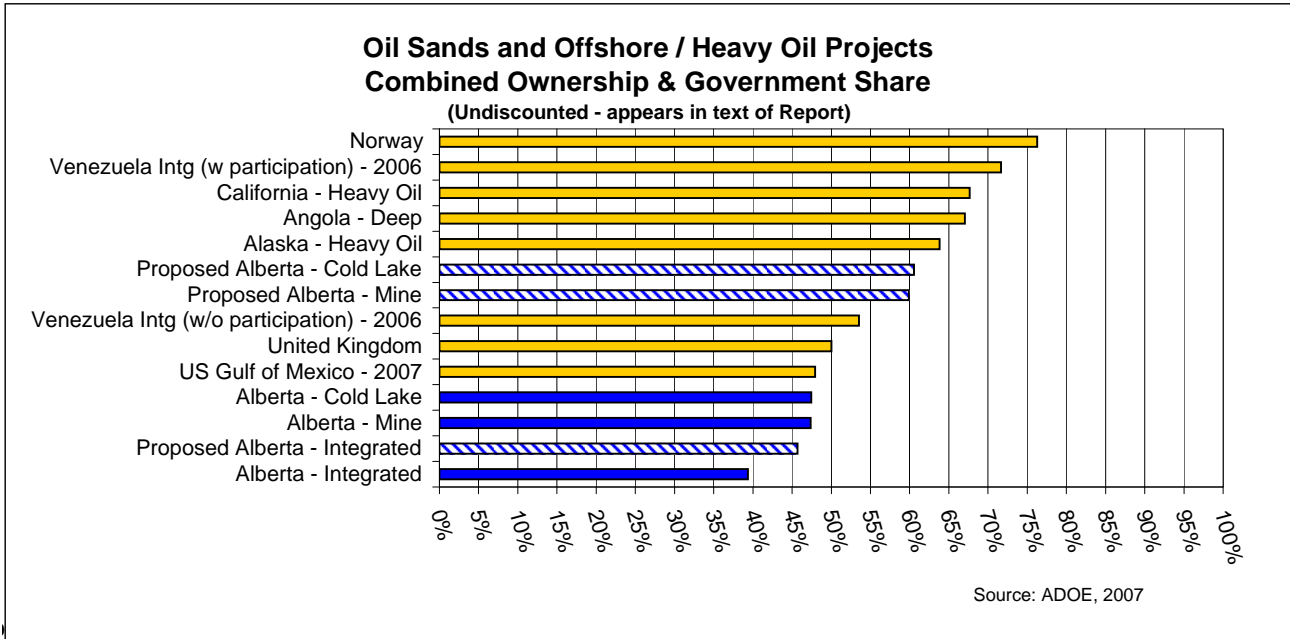
The top chart is reproduced from the Report. For all of the jurisdictions and in both charts, the estimated combined ownership and government shares reported are averages of cases that assume prices of \$(US) 50 to \$(US) 70/barrel of West Texas Intermediate (WTI) crude oil and different cost levels. See the discussion of the fiscal maps on page 6 below for more information. Note that adjustments were made to account for differences in crude oil quality and for differences in the location of production relative to markets, as appropriate.

The Panel's proposed "single-vintage" royalty system for conventional oil results in estimated (discounted and undiscounted) government shares of divisible income that remain lower than those collected in the five U.S. states considered.



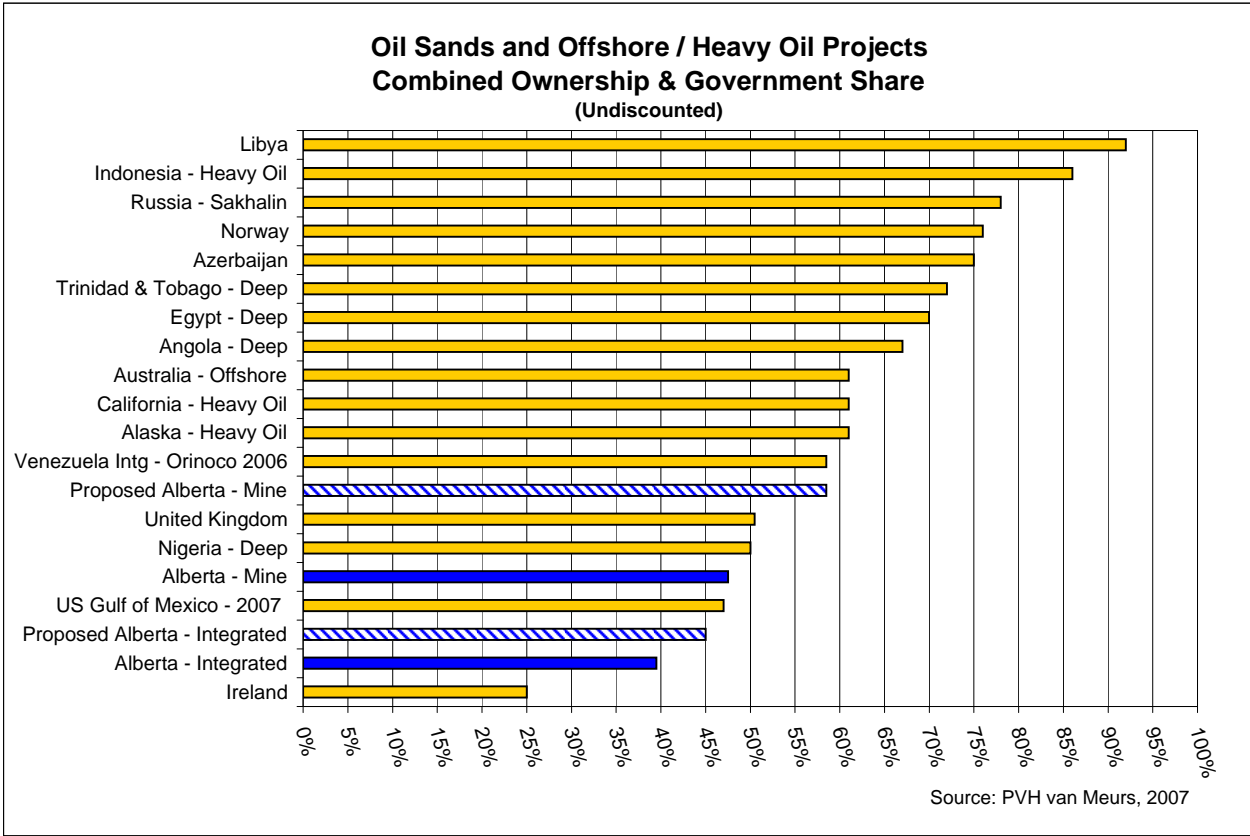
The top chart is reproduced from the Report. For all of the jurisdictions and in both charts, the estimated combined ownership and government shares reported are averages of cases that assume prices of \$(US) 6 to \$(US) 8/thousand cubic feet (Mcf) of natural gas and different cost levels. See the discussion of the fiscal maps on page 7 below for more information. Note that adjustments were made to account for differences in the location of production relative to markets, as appropriate.

The Panel also proposes a "single-vintage" royalty system for natural gas, which is seen to yield estimated ownership and government shares of divisible income slightly higher than one or two of the comparator jurisdictions. However, the Alberta share remains below the average for the five U.S. states considered



The top chart is reproduced from the Report. For all of the jurisdictions and in both charts, the assumed price of WTI is \$(US) 60/barrel (see the fiscal maps on pages 8 to 10 below for more details). Note that appropriate adjustments have been made for differences in the quality of crude oils and for locational differences relative to markets. "Venezuela Intg (w/o participation) - 2006" represents the estimated implications of the Venezuelan royalty and tax system as of 2006. "Venezuela Intg (w participation) - 2006" begins with the same royalty and tax system, but also includes the implications of the direct government participation provisions in Venezuelan oil development and production projects.

The Panel's proposed royalty and tax system for oil sands yields an estimated government share of divisible income for production-only projects higher than that of a few comparator jurisdictions. However, the results also suggest that a number of key international destinations for investments in oil-production projects have higher combined ownership and production shares of divisible income than those estimated for Alberta oil sands projects under the Panel's proposal.



The Panel also asked PVH van Meurs to undertake an assessment of its proposed royalty and tax system for oil sands operations. The above chart reports the results of some of the analysis undertaken by van Meurs. As with the ADOE work, for all of the jurisdictions considered, an assumed WTI price of \$(US) 60/barrel underlies the results reported above. Here again, appropriate adjustments have been made for differences in the quality of crude oils and for locational differences relative to markets. There are slight differences in the cost structures assumed here as compared to those used in the ADOE work; there are also slight differences in model design. A broader range of comparator jurisdictions were considered by van Meurs. Note that "Venezuela Intg - Orinoco 2006" above is the counterpart to "Venezuela Intg (w/o participation) - 2006" in the ADOE work.

The Panel's proposed royalty and tax regime was applied to both typical open-pit bitumen mining and integrated (mining and upgrading) projects. The results obtained by van Meurs are consistent with those from the ADOE work: under the Panel's proposed regime, Alberta oil sands remain a competitive destination for investments in oil production projects, by international standards.

Color Code	Gov Share
Red	Stop
Yellow	Very Low
Blue	Low
Green	Average
Gold	High
Magenta	Very High

Follows the same code as Gov%5

Royalty Review Panel Proposal - Conventional Oil							
Government Share (Undiscounted Nominal Dollars)							
Price Cases		Cost Sensitivities					
Alberta Cdn \$	WTI US \$	CL6	CL5	CL4	CL3	CL2	CL1
		34.43	30.68	26.65	23.04	19.89	16.82
32.59	30	n/a	48.2%	38.8%	47.4%	56.1%	62.4%
43.96	40	33.7%	33.1%	37.6%	46.2%	54.6%	61.3%
55.32	50	31.8%	33.2%	41.4%	50.2%	58.3%	64.9%
66.68	60	32.3%	36.7%	45.5%	54.1%	62.0%	68.4%
78.05	70	34.8%	39.4%	47.8%	56.0%	63.6%	68.4%
89.41	80	38.3%	42.5%	50.3%	58.2%	65.4%	68.7%
100.78	90	41.6%	45.4%	52.8%	60.4%	66.6%	68.8%
112.14	100	44.3%	47.7%	54.7%	62.0%	66.7%	68.2%
123.50	110	44.1%	47.5%	54.3%	61.6%	66.0%	67.6%
134.87	120	43.6%	46.9%	53.8%	61.0%	65.4%	67.1%

Color Code	Gov%5 Share
Red	Stop
Yellow	Very Low
Blue	Low
Green	Average
Gold	High
Magenta	Very High

< 50%
50% - 59%
60% - 69%
70% - 85%
> 85%

Royalty Review Panel Proposal - Conventional Oil							
Government Share (Discounted @ 5% Real)							
Price Cases		Cost Sensitivities					
Alberta Cdn \$	WTI US \$	CL6	CL5	CL4	CL3	CL2	CL1
		34.43	30.68	26.65	23.04	19.89	16.82
32.59	30	n/a	72.0%	40.5%	51.3%	60.9%	66.8%
43.96	40	34.0%	33.0%	38.6%	48.6%	57.7%	64.4%
55.32	50	31.7%	33.3%	42.8%	52.5%	61.1%	67.7%
66.68	60	32.4%	37.2%	47.1%	56.4%	64.6%	71.0%
78.05	70	35.1%	40.1%	49.3%	58.1%	66.0%	70.5%
89.41	80	38.7%	43.1%	51.7%	60.1%	67.6%	70.4%
100.78	90	42.0%	46.1%	54.2%	62.2%	68.5%	70.2%
112.14	100	44.7%	48.4%	56.1%	63.9%	68.5%	69.5%
123.50	110	44.5%	48.1%	55.7%	63.4%	67.7%	68.9%
134.87	120	44.0%	47.6%	55.0%	62.7%	67.0%	68.3%

Source: ADOE, 2007

The above charts are fiscal maps that provide estimates, under various combinations of prices and costs, of the undiscounted (top) and the discounted (bottom) government share of divisible income under the Panel's proposed royalty regime for conventional oil. Ten different oil prices and six cost levels (CL) are considered, for a total of sixty different combinations captured in each map. Information drawn from these maps is included in the charts presented in the Report and on page 2 of this appendix. More specifically, an average of the estimated government shares reported in the hatched box in each chart was used. The same approach was used to estimate combined ownership and government shares in comparator jurisdictions.

The different cost levels from CL1 to CL6 represent progressively higher estimated real per barrel costs of exploration, development, and production.

The colour scheme reflects the results of a comparison with estimated outcomes for more than 300 royalty and tax systems in jurisdictions around the world, compiled by PVH van Meurs. For example, combined ownership and government shares are considered comparatively "very low" when the relevant entry is surrounded by yellow, and "average" when the relevant entry is surrounded by green. Note as well that a "red" entry indicates a situation where estimated operating revenues to the producer are negative.

The Panel's proposals are estimated to result in a royalty and tax system for conventional oil that is generally price progressive (for a given cost level, the estimated government share - whether discounted or not - rises with higher price levels) and generally cost progressive (for a given price level, both discounted and undiscounted estimated government shares fall as costs rise).

Color Code	Gov. Share
Red	Stop
Yellow	Very Low
Blue	Low
Green	Average
Gold	High
Magenta	Very High

Follows the same code as Gov%5

Royalty Review Panel Proposal - Natural Gas							
Government Share (Undiscounted Nominal Dollars)							
Prices Cases		Cost Sensitivities					
Alberta	H.Hub	CL6	CL5	CL4	CL3	CL2	CL1
Can \$	US \$	3.72	3.41	3.09	2.77	2.41	2.07
\$3.35	\$4	n/a	n/a	n/a	n/a	88.2%	77.5%
\$4.48	\$5	46.7%	59.1%	63.6%	68.5%	69.2%	67.0%
\$5.62	\$6	44.1%	54.0%	59.0%	64.4%	66.7%	66.0%
\$6.75	\$7	47.4%	55.4%	60.0%	65.1%	67.6%	67.5%
\$7.89	\$8	49.5%	56.5%	60.8%	65.7%	68.4%	68.6%
\$9.03	\$9	50.2%	56.8%	61.0%	65.8%	68.6%	69.1%
\$10.16	\$10	51.2%	57.5%	61.6%	66.3%	69.2%	69.8%
\$11.30	\$11	52.4%	58.5%	62.5%	67.1%	70.0%	70.6%
\$12.44	\$12	53.7%	59.6%	63.5%	67.7%	69.9%	70.3%
\$13.57	\$13	55.1%	60.8%	64.7%	68.1%	69.8%	69.9%

Color Code	Gov%5 Share
Red	Stop
Yellow	Very Low
Blue	Low
Green	Average
Gold	High
Magenta	Very High

< 50%
50% - 59%
60% - 69%
70% - 85%
> 85%

Royalty Review Panel Proposal - Natural Gas							
Government Share (Discounted @ 5% Real)							
Prices Cases		Cost Sensitivities					
Alberta	H.Hub	CL6	CL5	CL4	CL3	CL2	CL1
Can \$	US \$	3.72	3.41	3.09	2.77	2.41	2.07
\$3.35	\$4	n/a	n/a	n/a	n/a	102.2%	84.4%
\$4.48	\$5	52.6%	67.8%	71.7%	75.6%	74.3%	70.2%
\$5.62	\$6	46.5%	58.0%	63.5%	68.8%	70.1%	68.4%
\$6.75	\$7	49.2%	58.4%	63.3%	68.5%	70.4%	69.4%
\$7.89	\$8	50.9%	58.9%	63.6%	68.6%	70.8%	70.3%
\$9.03	\$9	51.4%	58.8%	63.4%	68.3%	70.7%	70.5%
\$10.16	\$10	52.3%	59.3%	63.8%	68.6%	71.1%	71.2%
\$11.30	\$11	53.4%	60.1%	64.5%	69.3%	71.8%	71.9%
\$12.44	\$12	54.6%	61.1%	65.4%	69.6%	71.5%	71.4%
\$13.57	\$13	55.9%	62.2%	66.4%	69.8%	71.1%	70.9%

Source: ADOE, 2007

The above charts are fiscal maps that provide estimates, under various combinations of prices and costs, of the undiscounted (top) and the discounted (bottom) government share of divisible income under the Panel's proposed royalty regime for natural gas. Ten different natural gas prices and six cost levels (CL) are considered, for a total of sixty different combinations captured in each map. Information drawn from these maps is included in the charts presented in the Report and on page 3 of this appendix. More specifically, an average of the estimated government shares reported in the hatched box in each chart was used. The same approach was used to estimate combined ownership and government shares in comparator jurisdictions. Note that "H.Hub" stands for "Henry Hub", a key U.S. pricing point for natural gas.

The different cost levels from CL1 to CL6 represent progressively higher estimated real exploration, development, and production costs per thousand cubic feet.

The colour scheme reflects the results of a comparison with estimated outcomes for more than 300 royalty and tax systems in jurisdictions around the world, compiled by PVH van Meurs. For example, combined ownership and government shares are considered comparatively "low" when the relevant entry is surrounded by blue, and "high" when the relevant entry is surrounded by gold. A "red" entry indicates a situation where estimated operating revenues to the producer are negative. Note that the "high" estimated government shares (in gold) occur mostly at low cost levels.

The Panel's proposals are estimated to result in a royalty and tax system for natural gas that is rather neutral with respect to price at low cost levels, and more price progressive (for a given cost level, the estimated government share - whether discounted or not - rises with higher price levels) at higher costs. The proposed system is also generally cost progressive (for a given price level, both discounted and undiscounted estimated government shares fall as costs rise).

Color Code	Gov Share
Red	Stop
Yellow	Very Low
Blue	Low
Green	Average
Gold	High
Magenta	Very High

Follows the same code as Gov%5

Royalty Review Panel Proposal - Cold Lake SAGD (60,000 bpd)								
Government Share of Divisible Income (Undiscounted Nominal Dollars)								
Prices Cases		Cost Sensitivities						
Bitumen	WTI	\$/Peakbbl	\$25,650	\$22,800	\$19,000	\$15,200	\$13,300	\$11,400
Can \$	US \$	Total \$/bbl	17.61	16.41	14.81	13.21	12.41	11.61
17.74	30		49.0%	53.9%	55.2%	55.4%	55.3%	55.3%
23.66	40		56.4%	56.4%	56.2%	56.0%	55.9%	55.8%
29.57	50		59.5%	59.1%	58.6%	58.1%	57.9%	57.7%
35.48	60		61.7%	61.2%	60.6%	60.0%	59.8%	59.5%
41.40	70		63.6%	63.0%	62.4%	61.8%	61.5%	61.2%
47.31	80		65.2%	64.7%	64.0%	63.4%	63.1%	62.8%
53.23	90		65.8%	65.3%	64.7%	64.1%	63.8%	63.5%
59.14	100		65.7%	65.2%	64.7%	64.2%	63.9%	63.7%
65.05	110		65.4%	64.9%	64.4%	64.0%	63.8%	63.5%
70.97	120		65.0%	64.7%	64.2%	63.8%	63.6%	63.4%

Color Code	Gov%5 Share
Red	Stop
Yellow	Very Low
Blue	Low
Green	Average
Gold	High
Magenta	Very High

< 50%
50% - 59%
60% - 69%
70% - 85%
> 85%

Royalty Review Panel Proposal - Cold Lake SAGD (60,000 bpd)								
Government Share of Divisible Income (Discounted @ 5% Real)								
Prices Cases		Cost Sensitivities						
Bitumen	WTI	\$/Peakbbl	\$25,650	\$22,800	\$19,000	\$15,200	\$13,300	\$11,400
Can \$	US \$	Total \$/bbl	17.61	16.41	14.81	13.21	12.41	11.61
17.74	30		257.8%	90.6%	68.7%	62.0%	60.0%	58.7%
23.66	40		71.3%	66.1%	61.9%	59.5%	58.6%	57.9%
29.57	50		67.4%	64.9%	62.4%	60.6%	59.8%	59.2%
35.48	60		67.1%	65.3%	63.4%	61.8%	61.2%	60.6%
41.40	70		67.7%	66.1%	64.6%	63.2%	62.6%	62.0%
47.31	80		68.5%	67.3%	65.7%	64.5%	63.9%	63.4%
53.23	90		69.0%	67.8%	66.5%	65.3%	64.8%	64.3%
59.14	100		68.7%	67.7%	66.5%	65.5%	65.0%	64.6%
65.05	110		67.9%	67.1%	66.1%	65.2%	64.8%	64.4%
70.97	120		67.3%	66.6%	65.7%	65.0%	64.6%	64.2%

Source: ADOE, 2007

The above charts are fiscal maps that provide estimates, under various combinations of prices and costs, of the undiscounted (top) and the discounted (bottom) government share of divisible income under the Panel's proposed royalty and tax regime for oil sands operations. Here, a steam-assisted gravity drainage (SAGD) bitumen production project located in the Cold Lake area is considered. Peak daily production is assumed to be 60,000 barrels/day. Ten different oil prices and six cost levels are considered, for a total of sixty different combinations captured in each map. Information drawn from these maps is included in the charts presented in the Report and on page 4 of this appendix. The same approach was used to estimate combined ownership and government shares in comparator jurisdictions.

Moving right to left in each fiscal map, the different cost levels represent progressively higher real costs of development and production. "\$/peak bbl" stands for total real capital expenditures until peak production is reached per peak barrel of production (the highest level of daily production realized by the project). "total \$/bbl" stands for total real capital and operating costs per barrel produced over the entire life of the project.

The colour scheme reflects the results of a comparison with estimated outcomes for more than 300 royalty and tax systems in jurisdictions around the world, compiled by PVH van Meurs. For example, combined ownership and government shares are considered comparatively "low" when the relevant entry is surrounded by blue, and "average" when the relevant entry is surrounded by green. A "red" entry indicates a situation where estimated operating revenues to the producer are negative.

The Panel's proposals are estimated to result in a royalty and tax system that is slightly price progressive (for a given cost level, the estimated government share rises with higher price levels), especially in the undiscounted cases and at lower cost levels. The proposed system is also slightly cost regressive (for a given price level, both discounted and undiscounted estimated government shares rise as costs increase).

Color Code	Gov Share
Red	Stop
Yellow	Very Low
Blue	Low
Green	Average
Gold	High
Magenta	Very High

Follows the same code as Gov%5

Royalty Review Panel Proposal - Athabasca Mine (200,000 bpd)								
Government Share of Divisible Income (Undiscounted Nominal Dollars)								
Prices Cases		Cost Sensitivities						
Bitumen	WTI	\$/Peakbbl	\$35,750	\$31,460	\$28,600	\$24,310	\$21,450	\$18,590
Can \$	US \$	Total \$/bbl	13.97	12.49	11.51	10.04	9.06	8.07
14.87	30		43.5%	44.3%	51.1%	53.9%	54.5%	54.8%
19.83	40		54.0%	55.1%	55.5%	55.5%	55.5%	55.4%
24.78	50		58.7%	58.4%	58.1%	57.7%	57.5%	57.3%
29.74	60		60.8%	60.3%	59.9%	59.4%	59.1%	58.8%
34.70	70		62.5%	61.9%	61.5%	61.0%	60.6%	60.3%
39.66	80		63.6%	63.0%	62.6%	62.1%	61.7%	61.4%
44.61	90		63.8%	63.2%	62.9%	62.4%	62.1%	61.8%
49.57	100		63.5%	63.1%	62.7%	62.3%	62.0%	61.8%
54.53	110		63.2%	62.7%	62.5%	62.1%	61.8%	61.6%
59.48	120		62.9%	62.5%	62.3%	61.9%	61.7%	61.5%

Color Code	Gov%5 Share
Red	Stop
Yellow	Very Low
Blue	Low
Green	Average
Gold	High
Magenta	Very High

< 50%
50% - 59%
60% - 69%
70% - 85%
> 85%

Royalty Review Panel Proposal - Athabasca Mine (200,000 bpd)								
Government Share of Divisible Income (Discounted @ 5% Real)								
Prices Cases		Cost Sensitivities						
Bitumen	WTI	\$/Peakbbl	\$35,750	\$31,460	\$28,600	\$24,310	\$21,450	\$18,590
Can \$	US \$	Total \$/bbl	13.97	12.49	11.51	10.04	9.06	8.07
14.87	30		n/a*	n/a*	114.6%	72.3%	65.3%	61.5%
19.83	40		89.9%	71.8%	66.7%	62.2%	60.2%	58.9%
24.78	50		71.5%	66.6%	64.2%	61.8%	60.7%	59.6%
29.74	60		68.5%	65.7%	64.2%	62.4%	61.3%	60.5%
34.70	70		67.9%	65.8%	64.7%	63.2%	62.3%	61.6%
39.66	80		68.0%	66.3%	65.2%	63.9%	63.2%	62.5%
44.61	90		67.7%	66.3%	65.5%	64.3%	63.6%	63.0%
49.57	100		67.0%	65.9%	65.2%	64.2%	63.6%	63.1%
54.53	110		66.3%	65.2%	64.6%	63.8%	63.2%	62.8%
59.48	120		65.5%	64.6%	64.1%	63.4%	63.0%	62.5%

The above charts are fiscal maps that provide estimates, under various combinations of prices and costs, of the undiscounted (top) and the discounted (bottom) government share of divisible income under the Panel's proposed royalty and tax regime for oil sands operations. Here, an open pit bitumen mining project located in the Athabasca area is considered. Peak daily production is assumed to be 200,000 barrels/day. Ten different oil prices and six cost levels are considered, for a total of sixty different combinations captured in each map. Information drawn from these maps is included in the charts presented in the Report and on page 4 of this appendix. The same approach was used to estimate combined ownership and government shares in comparator jurisdictions.

Moving right to left in each fiscal map, the different cost levels represent progressively higher real costs of development and production. "\$/peak bbl" stands for total real capital expenditures until peak production is reached per peak barrel of production (the highest level of daily production realized by the project). "total \$/bbl" stands for total real capital and operating costs per barrel produced over the entire life of the project.

The colour scheme reflects the results of a comparison with estimated outcomes for more than 300 royalty and tax systems in jurisdictions around the world, as compiled by PVH van Meurs. For example, combined ownership and government shares are considered comparatively "low" when the relevant entry is surrounded by blue, and "average" when the relevant entry is surrounded by green. A "red" entry indicates a situation where estimated operating revenues to the producer are negative.

The Panel's proposals are estimated to result in a royalty and tax system that is slightly price progressive at lower costs and slightly price regressive (for a given cost level, the estimated government share - whether discounted or not - falls with higher prices), especially at higher cost levels. The proposed system is also slightly cost regressive (for a given price level, both discounted and undiscounted estimated government shares rise as costs increase).

Color Code	Gov Share
Red	Stop
Yellow	Very Low
Blue	Low
Green	Average
Gold	High
Magenta	Very High

Follows the same code as Gov%5

Royalty Review Panel Proposal - Athabasca Integrated Mine (170,000 bpd)									
Government Share of Divisible Income (Undiscounted Nominal Dollars)									
Prices Cases		Cost Sensitivities							
Bitumen	WTI	\$/Peakbbl	\$83,382	\$73,376	\$66,706	\$56,700	\$50,029	\$43,359	
Can \$	US \$	Total \$/bbl	28.70	25.70	23.69	20.69	18.69	16.69	
14.87	30		32.7%	35.1%	39.2%	41.4%	42.1%	42.6%	
19.83	40		41.0%	42.1%	42.6%	43.0%	43.2%	43.3%	
24.78	50		44.3%	44.4%	44.4%	44.5%	44.5%	44.5%	
29.74	60		45.8%	45.8%	45.7%	45.6%	45.5%	45.5%	
34.70	70		47.0%	46.8%	46.7%	46.6%	46.4%	46.4%	
39.66	80		47.8%	47.5%	47.4%	47.2%	47.1%	47.0%	
44.61	90		48.0%	47.8%	47.7%	47.5%	47.3%	47.2%	
49.57	100		47.9%	47.7%	47.6%	47.5%	47.4%	47.3%	
54.53	110		47.8%	47.6%	47.5%	47.4%	47.3%	47.2%	
59.48	120		47.7%	47.5%	47.5%	47.3%	47.3%	47.2%	

Color Code	Gov%5 Share
Red	Stop
Yellow	Very Low
Blue	Low
Green	Average
Gold	High
Magenta	Very High

< 50%
50% - 59%
60% - 69%
70% - 85%
> 85%

Royalty Review Panel Proposal - Athabasca Integrated Mine (170,000 bpd)									
Government Share of Divisible Income (Discounted @ 5% Real)									
Prices Cases		Cost Sensitivities							
Bitumen	WTI	\$/Peakbbl	\$83,382	\$73,376	\$66,706	\$56,700	\$50,029	\$43,359	
Can \$	US \$	Total \$/bbl	28.70	25.70	23.69	20.69	18.69	16.69	
14.87	30		n/a	n/a	84.7%	55.4%	50.7%	48.2%	
19.83	40		66.8%	54.8%	51.4%	48.5%	47.2%	46.3%	
24.78	50		54.1%	51.0%	49.5%	48.0%	47.3%	46.6%	
29.74	60		52.0%	50.2%	49.3%	48.2%	47.6%	47.0%	
34.70	70		51.5%	50.2%	49.5%	48.6%	48.1%	47.6%	
39.66	80		51.4%	50.4%	49.7%	49.0%	48.5%	48.1%	
44.61	90		51.2%	50.3%	49.8%	49.1%	48.7%	48.4%	
49.57	100		50.7%	50.1%	49.6%	49.0%	48.7%	48.4%	
54.53	110		50.3%	49.6%	49.3%	48.8%	48.5%	48.2%	
59.48	120		49.8%	49.3%	49.0%	48.6%	48.3%	48.1%	

The above charts are fiscal maps that provide estimates, under various combinations of prices and costs, of the undiscounted (top) and the discounted (bottom) government share of divisible income under the Panel's proposed royalty and tax regime for oil sands operations. Here, an integrated project (mining plus upgrading) located in the Athabasca area is considered. Peak daily bitumen production is assumed to be 200,000 barrels/day, while 170,000 barrels/day represents peak daily synthetic crude oil production. Ten different oil prices and six cost levels are considered, for a total of sixty different combinations captured in each map. Information drawn from these maps is included in the charts presented in the Report and on page 4 of this appendix. The same approach was used to estimate combined ownership and government shares in comparator jurisdictions.

Moving right to left in each fiscal map, the different cost levels represent progressively higher real costs of development and production. "\$/peak bbl" stands for total real capital expenditures until peak production is reached per peak barrel of production (the highest level of daily production realized by the project). "total \$/bbl" stands for total real capital and operating costs per barrel produced over the entire life of the project.

The colour scheme reflects the results of a comparison with estimated outcomes for more than 300 royalty and tax systems in jurisdictions around the world, compiled by PVH van Meurs. For example, combined ownership and government shares are considered comparatively "low" when the relevant entry is surrounded by blue, and "very low" when the relevant entry is surrounded by yellow. A "red" entry indicates a situation where estimated operating revenues to the integrated producer are negative.

The Panel's proposals are estimated to result in a royalty and tax system that is relatively neutral with respect to prices, especially in the discounted cases. The proposed system is also relatively neutral with respect to cost levels (there is some evidence of cost regressivity in the discounted cases, especially at higher cost levels where the estimated government share is higher). Government shares of divisible income are lower for integrated projects (than for bitumen production-only projects) since royalties and taxes are assumed levied against bitumen production, whereas only the corporate income tax is applicable to upgrader operations.

Color Code	PFR10
Red Stop	< 1.15
Green Average	1.15 - 1.75
Blue High	1.76 - 2.50
Yellow Very High	> 2.50

Royalty Review Panel Proposal - Conventional Oil							
PFR10 (Real 10%)							
Price Cases		CL6	CL5	CL4	CL3	CL2	CL1
Alberta Cdn \$	WTI US \$						
32.59	30	0.86	0.98	1.13	1.25	1.34	1.47
43.96	40	1.21	1.38	1.55	1.68	1.77	1.93
55.32	50	1.56	1.76	1.90	2.00	2.08	2.23
66.68	60	1.89	2.07	2.18	2.26	2.31	2.44
78.05	70	2.18	2.36	2.47	2.55	2.59	2.83
89.41	80	2.42	2.62	2.72	2.79	2.82	3.20
100.78	90	2.63	2.84	2.94	2.99	3.07	3.59
112.14	100	2.83	3.05	3.15	3.18	3.38	4.02
123.50	110	3.11	3.36	3.47	3.51	3.75	4.47
134.87	120	3.41	3.69	3.81	3.85	4.13	4.91

The above charts are fiscal maps that provide estimates, under various combinations of prices and costs, of a measure of investor profitability to provide context to the government share maps shown on other pages under the Panel's proposed royalty regime for conventional oil. Shown above is the profitability ratio (PFR10) which is simply the net present value discounted at 10 per cent real (12.2 per cent nominal) plus the capital invested discounted at 10 per cent real divided by the capital invested discounted at 10 per cent. Ten different oil prices and six cost levels (CL) are considered, for a total of sixty different combinations captured in each map.

The different cost levels from CL1 to CL6 represent progressively higher estimated real per barrel costs of exploration, development, and production.

The colour scheme reflects the results of a comparison with estimated outcomes for more than 300 royalty and tax systems in jurisdictions around the world, compiled by PVH van Meurs. For example, from the investor's perspective, the estimated profitability ratio is considered average when the the relevant entry is surrounded by green, and comparatively "very high" when the relevant entry is surrounded by yellow. Note as well that a "red" entry indicates a situation where the profitability ratio is estimated to be less than 1.15.

The Panel's proposals are estimated to result in profitability ratios that remain attractive to investors, by international standards.

Color Code	PFR10
Red Stop	< 1.15
Green Average	1.15 - 1.75
Blue High	1.76 - 2.50
Yellow Very High	> 2.50

Royalty Review Panel Proposal - Natural Gas							
PFR ₁₀ (Real 10%)							
Prices Cases		Cost Sensitivities					
Alberta	H.Hub	CL6	CL5	CL4	CL3	CL2	CL1
Can \$	US \$	3.72	3.41	3.09	2.77	2.41	2.07
\$3.35	\$4	n/a	n/a	n/a	n/a	0.92	1.10
\$4.48	\$5	1.09	1.09	1.13	1.17	1.30	1.55
\$5.62	\$6	1.38	1.37	1.41	1.45	1.60	1.91
\$6.75	\$7	1.62	1.59	1.63	1.67	1.85	2.18
\$7.89	\$8	1.85	1.81	1.85	1.88	2.07	2.44
\$9.03	\$9	2.09	2.04	2.08	2.11	2.31	2.73
\$10.16	\$10	2.31	2.25	2.28	2.31	2.53	2.98
\$11.30	\$11	2.52	2.44	2.47	2.49	2.72	3.21
\$12.44	\$12	2.71	2.62	2.64	2.68	2.98	3.54
\$13.57	\$13	2.88	2.77	2.79	2.88	3.25	3.89

The above charts are fiscal maps that provide estimates, under various combinations of prices and costs, of a measure of investor profitability to provide context to the government share maps shown on other pages under the Panel's proposed royalty regime for natural gas. Shown above is the profitability ratio (PFR10) which is simply the net present value discounted at 10 per cent real (12.2 per cent nominal) plus the capital invested discounted at 10 per cent real divided by the capital invested discounted at 10 per cent. Ten different natural gas prices and six cost levels (CL) are considered, for a total of sixty different combinations captured in each map.

The different cost levels from CL1 to CL6 represent progressively higher estimated real per barrel costs of exploration, development, and production.

The colour scheme reflects the results of a comparison with estimated outcomes for more than 300 royalty and tax systems in jurisdictions around the world, compiled by PVH van Meurs. For example, from the investor's perspective, the estimated profitability ratio is considered "average" when the relevant entry is surrounded by green, and comparatively "high" when the relevant entry is surrounded by blue. Note as well that a "red" entry indicates a situation where estimated profitability ratio is estimated to be less than 1.15.

The Panel's proposals are estimated to result in profitability ratios that remain attractive to investors, by international standards.

		Royalty Review Panel Proposal - Cold Lake SAGD (60,000 bpd)									
		NPV ₁₀ /boe (\$Real 10%)									
Color Code	NPV10 /boe	Prices Cases		Cost Sensitivities							
		Bitumen Can \$	WTI US \$	\$/Peakbbl Total \$/bbl	\$25,650	\$22,800	\$19,000	\$15,200	\$13,300	\$11,400	
Red	Stop	< 0.3	17.74	30	-0.68	-0.44	-0.14	0.15	0.29	0.43	
			23.66	40	-0.23	-0.01	0.28	0.56	0.70	0.84	
Green	Average	0.3 - 1.50	29.57	50	0.13	0.34	0.63	0.91	1.05	1.18	
Blue	High	1.51 - 3.00	35.48	60	0.45	0.66	0.94	1.23	1.37	1.50	
Yellow	Very High	> 3.00	41.40	70	0.74	0.96	1.24	1.52	1.66	1.80	
			47.31	80	1.01	1.22	1.51	1.79	1.93	2.07	
			53.23	90	1.27	1.49	1.77	2.05	2.19	2.33	
			59.14	100	1.56	1.78	2.06	2.34	2.49	2.62	
			65.05	110	1.90	2.12	2.40	2.68	2.82	2.96	
			70.97	120	2.25	2.46	2.75	3.03	3.17	3.31	

		Royalty Review Panel Proposal - Cold Lake SAGD (60,000 bpd)									
		NPV ₁₀ (Millions \$Real 10%)									
Color Code	NPV10	Prices Cases		Cost Sensitivities							
		Bitumen Can \$	WTI US \$	\$/Peakbbl Total \$/bbl	\$25,650	\$22,800	\$19,000	\$15,200	\$13,300	\$11,400	
Red	Stop	Follows the same code as NPV10 /boe	17.74	30	-388.03	-250.74	-78.82	85.61	166.91	245.96	
			23.66	40	-129.51	-4.51	159.82	318.99	397.92	476.82	
Green	Average		29.57	50	74.57	196.01	356.53	515.95	596.86	674.38	
Blue	High		35.48	60	256.69	377.27	538.06	698.90	777.26	856.03	
Yellow	Very High		41.40	70	422.38	546.70	704.04	864.12	944.31	1,023.72	
			47.31	80	575.62	694.50	859.23	1,017.18	1,099.12	1,177.22	
			53.23	90	722.05	846.59	1,005.71	1,168.36	1,247.96	1,326.69	
			59.14	100	888.01	1,010.75	1,172.55	1,334.03	1,415.18	1,494.65	
			65.05	110	1,083.77	1,206.13	1,369.22	1,528.04	1,606.85	1,687.61	
			70.97	120	1,282.85	1,402.64	1,568.03	1,723.58	1,803.84	1,884.55	

The above charts are fiscal maps that provide estimates, under various combinations of prices and costs, of a measure of investor profitability to provide context to the government share maps shown on other pages under the Panel's proposed royalty regime for oil sands. Shown above in the bottom table is the net present value discounted at 10 per cent real (12.2 per cent nominal). The top table represents this value expressed on a per barrel basis. Ten different oil prices and six cost levels (CL) are considered, for a total of sixty different combinations captured in each map.

The different cost levels from CL1 to CL6 represent progressively higher estimated real per barrel costs of exploration, development, and production.

The colour scheme reflects the results of a comparison with estimated outcomes for more than 300 royalty and tax systems in jurisdictions around the world, compiled by PVH van Meurs. For example, from the investor's perspective, the discounted net present value of the project is estimated to be "average" when the relevant entry is surrounded by green, and comparatively "high" when the relevant entry is surrounded by blue. Note as well that a "red" entry indicates a situation where the per-barrel discounted net present value of the project is estimated to be less than 0.3.

The Panel's proposals are estimated to result in net present values that remain attractive to investors, by international standards.

Color Code	NPV10 /boe
Red Stop	< 0.3
Green Average	0.3 - 1.50
Blue High	1.51 - 3.00
Yellow Very High	> 3.00

Royalty Review Panel Proposal - Athabasca Mine (200,000 bpd)								
NPV ₁₀ /boe (\$Real 10%)								
Prices Cases		Cost Sensitivities						
Bitumen	WTI	\$/Peakbbl	\$35,750	\$31,460	\$28,600	\$24,310	\$21,450	\$18,590
Can \$	US \$	Total \$/bbl	13.97	12.49	11.51	10.04	9.06	8.07
14.87	30		-1.00	-0.70	-0.52	-0.26	-0.10	0.06
19.83	40		-0.56	-0.31	-0.15	0.09	0.25	0.40
24.78	50		-0.24	0.00	0.16	0.40	0.55	0.70
29.74	60		0.05	0.29	0.45	0.68	0.83	0.98
34.70	70		0.32	0.56	0.71	0.94	1.09	1.24
39.66	80		0.57	0.80	0.96	1.19	1.34	1.49
44.61	90		0.82	1.05	1.20	1.44	1.59	1.74
49.57	100		1.09	1.31	1.47	1.70	1.85	2.01
54.53	110		1.38	1.62	1.77	2.00	2.16	2.31
59.48	120		1.68	1.92	2.07	2.30	2.45	2.60

Color Code (Investor Perspective)	NPV10
Red Stop	Follows the same code as NPV10 /boe
Yellow	
Blue	
Green Average	
Gold High	
Magenta Very High	

Royalty Review Panel Proposal - Athabasca Mine (200,000 bpd)								
NPV ₁₀ (Millions \$Real 10%)								
Prices Cases		Cost Sensitivities						
Bitumen	WTI	\$/Peakbbl	\$35,750	\$31,460	\$28,600	\$24,310	\$21,450	\$18,590
Can \$	US \$	Total \$/bbl	13.97	12.49	11.51	10.04	9.06	8.07
14.87	30		-2,246.35	-1,573.34	-1,167.84	-592.02	-224.74	134.22
19.83	40		-1,262.13	-694.33	-329.20	208.13	563.51	907.91
24.78	50		-533.36	8.98	368.50	895.14	1,235.11	1,580.57
29.74	60		122.87	651.85	1,004.88	1,527.08	1,878.87	2,220.83
34.70	70		721.41	1,253.99	1,592.93	2,117.89	2,463.25	2,808.21
39.66	80		1,278.51	1,803.98	2,165.79	2,681.78	3,031.56	3,369.82
44.61	90		1,839.09	2,357.83	2,706.36	3,240.45	3,585.82	3,926.35
49.57	100		2,448.25	2,963.34	3,321.34	3,844.70	4,180.72	4,527.97
54.53	110		3,106.63	3,646.02	3,986.27	4,505.63	4,863.59	5,201.86
59.48	120		3,791.85	4,326.52	4,668.80	5,192.94	5,527.47	5,870.39

The above charts are fiscal maps that provide estimates, under various combinations of prices and costs, of a measure of investor profitability to provide context to the government share maps shown on other pages under the Panel's proposed royalty regime for oil sands. Shown above in the bottom table is the net present value discounted at 10 per cent real (12.2 per cent nominal). The top table represents this value expressed on a per barrel basis. Ten different oil prices and six cost levels (CL) are considered, for a total of sixty different combinations captured in each map.

The different cost levels from CL1 to CL6 represent progressively higher estimated real per barrel costs of exploration, development, and production.

The colour scheme reflects the results of a comparison with estimated outcomes for more than 300 royalty and tax systems in jurisdictions around the world, compiled by PVH van Meurs. For example, from the investor's perspective, the discounted net present value of the project is estimated to be "average" when the relevant entry is surrounded by green, and comparatively "high" when the relevant entry is surrounded by blue. Note as well that a "red" entry indicates a situation where the per-barrel discounted net present value of the project is estimated to be less than 0.3

The Panel's proposals are estimated to result in net present values that remain attractive to investors, by international standards.

Color Code	NPV10 /boe
Red Stop	< 0.3
Green Average	0.3 - 1.50
Blue High	1.51 - 3.00
Yellow Very High	> 3.00

Royalty Review Panel Proposal - Athabasca Integrated Mine (170,000 bpd)									
NPV ₁₀ /boe (\$Real 10%)									
Prices Cases		Cost Sensitivities							
Bitumen	WTI	\$/Peakbbl	\$83,382	\$73,376	\$66,706	\$56,700	\$50,029	\$43,359	
Can \$	US \$	Total \$/bbl	30.83	27.83	25.82	22.82	20.82	18.82	
14.87	30		-2.27	-1.60	-1.18	-0.57	-0.17	0.22	
19.83	40		-1.25	-0.64	-0.25	0.35	0.74	1.13	
24.78	50		-0.37	0.23	0.62	1.21	1.59	1.98	
29.74	60		0.48	1.06	1.46	2.04	2.43	2.82	
34.70	70		1.29	1.88	2.26	2.85	3.24	3.63	
39.66	80		2.08	2.67	3.06	3.65	4.04	4.42	
44.61	90		2.88	3.46	3.85	4.44	4.83	5.21	
49.57	100		3.70	4.28	4.67	5.26	5.64	6.03	
54.53	110		4.54	5.14	5.52	6.10	6.50	6.88	
59.48	120		5.40	5.99	6.38	6.96	7.35	7.73	

Color Code (Investor Perspective)	NPV10
Red Stop	Follows the same code as NPV10 /boe
Yellow	
Blue	
Green Average	
Gold High	
Magenta Very High	

Royalty Review Panel Proposal - Athabasca Integrated Mine (170,000 bpd)									
NPV ₁₀ (Millions \$Real 10%)									
Prices Cases		Cost Sensitivities							
Bitumen	WTI	\$/Peakbbl	\$83,382	\$73,376	\$66,706	\$56,700	\$50,029	\$43,359	
Can \$	US \$	Total \$/bbl	30.83	27.83	25.82	22.82	20.82	18.82	
14.87	30		-4,346.18	-3,075.52	-2,271.41	-1,097.67	-330.92	427.09	
19.83	40		-2,400.66	-1,234.09	-469.78	666.31	1,420.87	2,164.44	
24.78	50		-709.66	431.45	1,190.15	2,315.55	3,054.70	3,799.34	
29.74	60		911.06	2,038.80	2,791.00	3,911.97	4,662.94	5,404.07	
34.70	70		2,471.83	3,603.17	4,341.29	5,465.01	6,209.55	6,953.69	
39.66	80		3,991.16	5,115.39	5,876.38	6,991.14	7,740.09	8,477.53	
44.61	90		5,513.97	6,631.48	7,379.18	8,512.04	9,256.59	9,996.30	
49.57	100		7,087.61	8,201.46	8,958.64	10,080.77	10,815.96	11,562.39	
54.53	110		8,708.22	9,846.38	10,585.81	11,703.93	12,461.07	13,198.52	
59.48	120		10,355.68	11,489.11	12,230.57	13,353.47	14,087.18	14,829.28	

The above charts are fiscal maps that provide estimates, under various combinations of prices and costs, of a measure of investor profitability to provide context to the government share maps shown on other pages under the Panel's proposed royalty regime for oil sands. Shown above in the bottom table is the net present value discounted at 10 per cent real (12.2 per cent nominal). The top table represents this value expressed on a per barrel basis. Ten different oil prices and six cost levels (CL) are considered, for a total of sixty different combinations captured in each map.

The different cost levels from CL1 to CL6 represent progressively higher estimated real per barrel costs of exploration, development, and production.

The colour scheme reflects the results of a comparison with estimated outcomes for more than 300 royalty and tax systems in jurisdictions around the world, compiled by PVH van Meurs. For example, from the investor's perspective, the discounted net present value of the project is estimated to be "average" when the relevant entry is surrounded by green, and comparatively "very high" when the relevant entry is surrounded by yellow. Note as well that a "red" entry indicates a situation where the per-barrel discounted net present value of the project is estimated to be less than 0.3.

The Panel's proposals are estimated to result in net present values that remain attractive to investors, by international standards.